

Operate a tower crane

Code OHSCER225A

Workplace Health and Safety Queensland is moving to a new learning and assessment system for certificates to work in prescribed occupations. Learning and assessment will now be conducted in the Vocational Education and Training (VET) sector in which units of competency set out the knowledge and skills needed to demonstrate competent performance in a prescribed occupation.

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CODE: OHSCER225A

TITLE: Operate a tower crane

DESCRIPTOR: This unit of competency covers the functions required to operate a tower crane to meet minimum training and assessment standards for the purposes of certification. This unit has been developed in accordance with the licensing and assessment requirements of NOHSC:1006 [2001].

Element	Performance Criteria
1.0 Assess and secure equipment and work area	
1.1 Conduct routine checks	<p>1.1.1 Routine pre-operational equipment <i>checks</i> are carried out in accordance with the checklist provided for the crane.</p> <p>1.1.2 The service log book for the crane is checked to ensure all service requirements have been met and action taken as required.</p> <p>1.1.3 Prior to operation, <i>equipment</i> and <i>site</i> area are visually checked for any evidence of damage, structural weakness or interference, and any faults reported to an authorised person for corrective action.</p>
1.2 Plan Work	<p>1.2.1 A <i>workplace</i> operations plan is developed in consultation with the relevant authorised <i>workplace</i> personnel. The plan takes into account job requirements, priorities, workplace rules and procedures, identified <i>hazards</i> and hazard control measures.</p> <p>1.2.2 Site <i>hazards</i> are identified and correct hazard control strategies developed in accordance with the appropriate Australian Standard.</p> <p>1.2.3 Plans for emergency <i>procedures</i> take into account the location of first aid and fire fighting equipment, amenities and access/egress points in the workplace.</p> <p>1.2.4 Precautions are taken to accommodate the effects of weather conditions in accordance with the appropriate Australian Standard. This includes, where necessary, deciding to abort crane operation where weather conditions exceed acceptable limits.</p> <p>1.2.5 The operations plan ensures that the <i>work area</i> is correctly illuminated.</p> <p>1.2.6 The rig's load chart is located and information on permissible loads, radii, weights, boom and jib configurations noted and taken into account in operational plans.</p> <p>1.2.7 The signals and signalling systems to be used are confirmed with associated personnel in accordance with the appropriate Australian Standard.</p> <p>1.2.8 The use of safety tags on electrical switches/isolators (where relevant) is noted and correct <i>hazard</i> control procedures developed in consultation with authorised personnel.</p>

Element	Performance Criteria
1.3 Check controls and - lifting gear	<p>1.3.1 The crane is started in accordance with equipment <i>procedures</i> and checks made for any abnormal noise or movement. Any abnormal operation is reported to an authorised person for corrective action.</p> <p>1.3.2 The operating and emergency controls and safety devices are located and identified and their correct operation tested in accordance with prescribed procedures.</p> <p>1.3.3 All communication equipment, lighting and alarm systems are checked for correct operation.</p> <p>1.3.4 Defective controls, communication equipment, <i>safety</i> devices, lighting, or alarms are reported to authorised personnel for corrective action and the defects entered into the crane's service log book.</p> <p>1.3.5 The operating radii of the crane for planned operations is/are verified and measured taking into account the estimated increase in radius due to boom deflection. The boom is slewed at the planned radii to check that there are no unanticipated complications or obstructions.</p> <p>1.3.6 Slings and lifting gear are checked. Defective slings or lighting gear are identified and segregated and reported to an authorised person for disposal, repair and/or replacement in accordance with the appropriate Australian Standard.</p>
1.4 Shut down crane	<p>1.4.1 The crane is <i>shut down</i> using the correct sequence of procedures in accordance with manufacturer's instructions.</p> <p>1.4.2 Routine post-operational equipment <i>checks</i> are carried out in accordance with the checklist provided for the crane.</p> <p>1.4.3 The relevant motion locks and brakes are applied.</p> <p>1.4.4 All lifting equipment is checked in consultation with associated personnel for any signs of wear or damage in accordance with the appropriate Australian Standard.</p> <p>1.4.5 All defective equipment is segregated and reported to an authorised person for corrective action and/or replacement.</p> <p>1.4.6 The crane and equipment are correctly stowed and secured in accordance with manufacturer's instructions and the appropriate Australian Standard.</p>

Element	Performance Criteria
2.0 Secure and transfer load	
2.1 Secure load	<p>2.1.1 The weight of the load is correctly estimated in consultation with associated personnel.</p> <p>2.1.2 The sling configuration and choice of lifting gear are checked in consultation with associated personnel to ensure:</p> <ul style="list-style-type: none"> - they are appropriate for safe operation - they will not damage the load - they satisfy the requirements of the appropriate Australian Standard. <p>Corrective action is taken if required.</p> <p>2.1.3 The use of packing or dunnage to protect the load or to facilitate the connection of lifting gear is checked for correct application in consultation with associated personnel.</p>
2.2 Conduct trial lift.	<p>2.2.1 A trial lift, particularly for near capacity loads or loads of unusual weight distribution or shape, is carried out according to <i>workplace</i> procedures.</p> <p>2.2.2 With the load just suspended off the lifting plane, checks are made in consultation with associated personnel that:</p> <ul style="list-style-type: none"> - the load is correctly slung - all crane equipment is functioning properly - hydraulic or pneumatic systems (where relevant) are at the required operating pressure. <p>2.2.3 Where a trial lift reveals an unacceptable operational situation, the load is lowered and appropriate corrective action taken.</p> <p>2.2.4 Where load-measuring devices are fitted, the estimated weight is verified and load/radius calculations are revised as required.</p>
2.3 Transfer load	<p>2.3.1 Load is hoisted and lowered into position using all relevant crane movements in accordance with the appropriate Australian Standards.</p> <p>2.3.2 Boom is positioned to ensure load to be lifted is plumbed under hook.</p> <p>2.3.3 Each load is assessed in consultation with associated <i>personnel</i> for the need for a tag handline. Where control of the load is critical, a decision is made to attach a suitable tagline.</p> <p>2.3.4 All required signals are correctly given and interpreted in accordance with the appropriate Australian Standard.</p> <p>2.3.5 Planned <i>hazard</i> control strategies are implemented.</p>

Element	Performance Criteria
3.0 Set up and dismantle crane	
3.1 Erect and dismantle tower crane	<p>3.1.1 Plans are developed and/or interpreted for the erection, climbing and dismantling of tower crane in conjunction with associated personnel in accordance with the appropriate Australian Standard.</p> <p>3.1.2 Certification of associated personnel for the erection of tower crane is confirmed.</p> <p>3.1.3 Planned procedures for the erection, climbing and dismantling of tower crane are carried out in co-operation with associated personnel and in accordance with manufacturer's instructions and relevant statutory requirements.</p> <p>3.1.4 Planned <i>hazard</i> control measures are implemented.</p>
4.0 Carry out special operations with crane	
4.1 Travel crane	<p>4.1.1 Route to be travelled is planned to ensure that the crane traverses firm and level surfaces.</p> <p>4.1.2 Where slopes are unavoidable, an authorised person is consulted to ensure the feasibility of operation and the necessary <i>hazard</i> control measures are in place.</p> <p>4.1.3 The crane is travelled in accordance with the appropriate Australian Standard.</p> <p>This includes:</p> <ul style="list-style-type: none"> - minimum speed - gentle acceleration and braking (to minimise load swing) - carrying the load near to the ground surface - use of tagline ropes.
4.2 Carry out multiple crane lift	<p>4.2.1 Approval to carry out a multiple crane lift is obtained from the appropriate statutory authority.</p> <p>4.2.2 The multiple lift is planned and approved by an authorised person including:</p> <ul style="list-style-type: none"> - an assessment of the share of the load to be carried out by each crane - determination of the types of cranes suitable for use - the safety margins and hazard control measures to be used in the lift - the sequence of operations <p>4.2.3 The previously authorised plan of operations is carried out under supervision of an authorised person in accordance with the appropriate Australian Standard and other statutory regulations.</p>

Range Statement

The range of variables explains the range of contexts within which the performance and knowledge requirements of this standard may be assessed. The assessment must determine that there is sufficient skill and knowledge for the operator to take the licence and operate in a new workplace. The assessment must be adjustable but prescriptive to ensure transferability.

What may be involved in routine checks of tower cranes?

Plan and prepare

Planning and preparation is to include but not be limited to:

- worksite inspection
- equipment defect identification
- assessment of conditioning
- hazards
- determination of work requirements.

The tower crane requires erection and commissioning documentation prior to operation.

Tower cranes range considerably in their load capacity, height and jib extension.

Tower cranes are generally pre-erected by riggers and the use of mobile cranes.

Operations may include but not be limited to:

- slew left and right
- operate outriggers
- luff movements
- trolley in trolley out
- slew right and slew left
- winch up and down in combustion
- boom up and down
- operate attachments.

Pre-start

- Pre start checks must follow manufacturer's recommendations, Australian Standards and guidelines.
- Inspect crane and lifting gear for defects
- Ensure written documents are completed.
- Establish exclusion zones with barricades if necessary.
- Ensure relevant permits, authority to work are obtained.

Post-start

- Follow manufacturers' specifications and operating equipment.
- Checks may include but not limited to hazards warning systems, for example lights and horns are functional.
- Attachments, movement and control functions are smooth and comply with operating requirements.
- The operating, emergency controls and safety devices are located and identified and correctly tested in accordance with manufacturers' specifications.
- Communication signals to be confirmed with appropriate personnel.
- Defects and damage are reported according to site procedures.

What range of attachments may be used?

Attachment may include:

- fly jibs
- a-frame
- spreader bars
- spreader beams
- personnel boxes
- brick/block cages
- attachments
- safety hooks
- shackles
- hammer locks
- piling/boring
- equalizing equipment
- various types of slings
- general lifting gear.

What range of tower cranes may be operated?

Tower cranes range considerably in their load capacity, height and jib extension.

Types of tower cranes may include:

- ram luffers
- rope luffers
- hammerheads (trolley in/trolley out).

Workplace requirements may include but are not limited to:

- standard operating procedures
- industry standards
- production schedules
- material safety data sheets
- work notes and plans
- product labels
- manufacturers specifications
- enterprise policies and procedures (Including waste disposal, recycling guidelines)
- supervisors oral and written instructions
- current state/territory occupational health and safety legislation
- Australian standards
- codes of practice or advisory standards.

The necessary movements may include:

- luffing
- slewing
- hoisting (raising and lowering)
- telescoping boom
- travelling.

What *hazards* may be encountered in the workplace?

Hazards may include but not limited to:

- exposure to chemicals
- dangerous or hazardous substances
- explosive materials
- movements of equipment
- goods
- materials
- vehicular traffic.

Operating moving may include but not be limited to:

- overhead power lines
- trees
- overhead service lines such as steam, gas, water, telephone
- underground services
- uneven and/or unstable ground
- allowable floor loading as appropriate
- other workers and persons
- surrounding buildings
- vessels/structures equipment
- hazardous materials
- corrosive substances
- barricades
- explosive materials
- inadequate lighting
- radio interference
- inclement weather.

What *site/occupational* health and safety requirements may be relevant to this standard?

Site/occupational health and safety requirements are to include but not be limited to:

- safe systems and procedures for ensuring loads are secure and within working specifications
- identification and avoidance of obstacles during load-shifting operation
- hazard and risk control
- operator position to maintain unobstructed view
- handling including lifting and carrying
- manual handling
- the application of emergency/defensive action and techniques for controlling loads
- application and storage of hazardous substances
- outdoor work including protection from solar
- radiation
- noise
- dust
- rubbish
- protection of people in the workplace
- appropriate use and maintenance of personal protective equipment
- calculating loads
- using lifting equipment and associated gear to manufacturers specifications
- extreme environment temperatures (hot/cold)
- use of high visibility clothing/reflective vests
- traffic management
- barricades.

Safe operating *procedures* are to include but not be limited to:

- conduct of operational risk assessment and treatments associated with power cables (including overhead service trays, cables and conduits)
- lighting
- earth leakage boxes,
- trip hazards
- working with dangerous materials
- working in confined spaces
- surrounding structures
- restricted access barriers
- working at heights.

Emergency procedures related to equipment operation are to include but may not be limited to:

- emergency shutdown and stopping
- extinguishing equipment fires
- organisational first aid requirements
- evacuations.

What permits may be relevant to this standard?

Any permits required to carry out job activity are obtained from the relevant authorized personnel, for example confined spaces, chemical or dangerous goods storage, explosives, road and/or rail.

What *work area* may be relevant to this standard?

Work areas may include but not be limited to:

- factories
- wharfs
- ships
- warehouses
- manufacturing plants
- building sites
- road construction
- demolition sites
- quarries
- mine sites

What personal protective *equipment* may be relevant to this standard?

This may include but not be limited to:

- boots
- hat/hard hat
- overalls
- gloves
- protective eyewear
- hearing protection
- respirator or face mask
- sun protection
- task specific personal protective equipment

What needs to be considered for personal/public safety?

Site/non site *personnel* are safeguarded (protected) by a variety of measures including:

- the erection of barricades
- posting of signs
- traffic control consistent with principles of the hierarchy of control.
- appropriate equipment is selected to ensure personnel safety and protection.

Who are site/non site *personnel*?

Non site personnel may include but not limited to:

- members of the public
- visitors to the site
- delivery driver.

Site personnel may include but not limited to:

- employees
- contractors
- management or students.

How might the operation of a tower crane be demonstrated in a safe, controlled and correct manner?

Appropriate selection and use of:

- crane controls
- features
- settings and operational techniques for the specific settings, specific terrain and weather conditions in the day or night on varying infield terrain without causing damage to machinery, equipment, load, person, property or environment (including soils and property structures).

Correct operation includes using appropriate methods to load-shifting enterprise standards so that corrective actions including defensive techniques are implemented.

Operations may include but not be limited to:

- telescope in and out
- slew left and right
- operate outriggers
- luff movements
- trolley in trolley out,
- winch up and down in combination
- boom up and down
- operate attachments.

What procedures may be included in the *shut down* of a tower crane and securing of site?

The crane is shut down in accordance with manufacturers' instructions including:

- boom is correctly positioned as per manufacturer's requirements
- load lowered to the ground
- load is safe and in a stable position
- inspect, stow and secure all relevant equipment – lifting gear, attachments
- defective equipment is identified and segregated and reported to supervisor and logged and tagged
- lock equipment and remove key
- weather vane.

What records may need to be kept or updated?

- log books
- maintenance records
- records of faults and potential faults
- repairs carried out according to manufacturers specifications and operating procedures.

Evidence Guide

What evidence is required to demonstrate competence for this standard as a whole?

The evidence guide identifies the critical aspects, knowledge and skills to be demonstrated to confirm competency for this unit. This is an integral part of the assessment of competency and should be read in conjunction with the performance criteria, the range statement and the assessment guidelines.

Competence in this standard requires evidence of the ability to operate a tower crane without damage or injury to property or people. It requires the ability to plan job, select and inspect material and tools and move loads.

What **critical aspects** of evidence are required to demonstrate competency in this unit?

- Location, interpretation and application of relevant information, standards and specifications.
- Compliance with the site safety plan and occupational health and safety legislation/regulations/codes of practice/advisory standards applicable to workplace operations.
- Compliance with organisational policies and procedures including quality requirements.
- Safe and effective operational use of tools, plant and equipment.
- Communication and working effectively and safely with others.
- Completion of positioning, stabilizing, levelling and operation of a tower crane including all functions (including a multiple lift) to their maximum extension and travel in the lifting and moving of at least three differing types of sizes to different locations on the site.

What **specific knowledge** is needed to achieve the performance criteria?

- Operating principles and operating methods
- Legislative requirements with regard to licensing.
- General construction terminology
- Loadshifting processes and procedures.
- Principles of the safe removal of obstacles and hazards from the workplace.
- The hierarchy of hazard control measures with elimination of substitution, isolation and engineering control measures being selected before safe work practices and personal protective equipment.
- Workplace communication procedures.
- Demonstrate safe and environmentally responsible workplace practices.
- Processes for the calculation of material requirements.
- Understanding limitations of equipment
- Specifications of equipments and how they relate to loads
- Designs and functions of lifting equipment.
- Safe working load tags.
- Obtain licenses and permits.
- Demonstrate safe and environmentally responsible workplace practices.

What **specific skills** are needed to achieve the performance criteria?

- Readily familiarise self with local conditions.
- Demonstrate emergency operating procedures.
- Read and interpret site planning, manufacturers' specifications, work and maintenance plans and material safety data sheets.
- Comprehend and apply task instructions.
- Working with other plant operators.
- Assess weight of load, select slings and determine crane capability
- Ability to work at heights and falls arrest
- Emergency situations
- Able to listen and understand job requirement.
- Understand written documents for job processes.
- Understand tables and figures for job procedures.
- Understand interrelationship among workplace processes and procedures in the English language.
- Understand and interpret signals and instructions in the English language.
- Hand/eye co-ordination.
- Problem solving skills would be required to apply slinging techniques including the selection and/or inspection of lifting gear, or the directing of a crane/hoist operator in the movement of a load when the load is out of the operator's view.
- The exercising of judgement in relation to the suitability and condition of lifting gear, and the method of slinging, by consideration of the nature of the load, its mass and its centre of gravity.
- Identify and eliminate defective equipment and/or gear.

What **methods of** assessment should apply?

- Assessment methods must confirm consistency and accuracy of performance together with application of underpinning knowledge.
- Assessment must include as a minimum the achievement of competence to the standard established in the NOHSC assessment instrument. Additional requirements may need to be achieved to comply with the AQTF including key competencies.
- Assessment methods must confirm the ability to access and correctly interpret and apply the essential underpinning knowledge.
- Assessment must be applied in a real work environment or replicated industrial workplace.

In what **context** should the assessment occur?

- The application of competency is to be assessed in the workplace or replicated industrial workplace.
- Assessment is to occur using standard and authorised work practices including safety equipment and environmental constraints.
- Assessment of essential underpinning knowledge, other than the confirmatory questions, will usually be conducted in an off-site context.
- Assessment is to comply with relevant regulatory requirements including specific Australian Standards.

What are the **specific resource requirements** for this unit?

- Workplace location or replicated work facility in accordance with the OHS instrument relating to the OHS jurisdiction.
- Tools and equipment appropriate to loadshifting
- Specifications and work instructions
- Appropriate crane
- Communication equipment (radios/whistles) (where applicable)
- Occupational Health and Safety Certification Training and Assessment Delivery Guide
- Occupational health and safety assessment instruments
- Occupational health and safety authority learner guide
- Occupational health and safety authority trainer guide.

What key competencies processes should be applied to this unit of competency?

There are a number of processes that are learnt throughout work and life which are required in all jobs. They are fundamental processes and generally transferable to other work functions. Some of these covered by the key competencies, although other may be added. The questions below highlight how these processes are applied in this competency standard. Following each question is the number in brackets indicates the level to which the key competency needs to be demonstrated where:

0 = not required

1 = perform the process

2 = perform and administer the process

3 = performance, administer and design the process

1. How can communication of ideas and information be applied)	Communicate ideas and information orally and in writing in simple English to enable confirmation of work requirements, passage of information and requests to other workers during operations and the reporting and recording of work outcomes.	Level 1
2. How can information be collected, analysed and organised?	Collect, organize, interpret and understand the information required for operating a crane including work instructions, plans, sketches, diagrams, safety instructions, labels, quality procedures, manufacturers instructions, material safety data sheets and equipment instructions	Level 1
3. How can activities be planned and organised?	Conduct activities associated with operating tower crane including the coordination and use of equipment, materials and tools to avoid back tracking and rework.	Level 1
4. How can team work be applied?	Work with others and in a team by recognizing dependencies and using co-operative approaches to optimize satisfaction and productivity.	Level 1
5. How can the use of mathematical ideas and techniques be applied?	Use mathematical ideas and techniques to correctly calculate time to complete tasks, estimate measurements, distances and levels, calculate material requirements and establish quality checks.	Level 1
6. How can problem solving skills be applied?	Establish safe and effective work processes which anticipate likely problems and blockages and systematically work around those to avoid or minimize reworking and avoid wastage.	Level 1
7. How can the use of technology be applied	Use workplace technology related to operating a crane including the use of calculators, the use of communication devices and the reporting and/or recording of results.	Level 1

Are there any other competency standards that could be assessed with this one?

This competency standard could be assessed on its own or in combination with the other units of competency relevant to the job function.

It is strongly recommended people wishing to undertake this unit possesses dogging competencies and relevant current industry experience. This may be demonstrated through a log book or record of training.

There is essential information about assessing this competency standard for the consistent performance and where and how it may be assessed in the Assessment Guideline developed by the National Occupational Health and Safety Commission. All users of this competency standard must have access to this guideline.